

**I-80 Corridor Database and Portal
Concept of Operations
Technical Memorandum**

1. Introduction

This memorandum defines the hi-level (conceptual) needs and features of the I-80 Corridor Database and Portal for the Iowa DOT. This document is the first in a series of technical memorandums that will identify the issues, needs, and identified solutions for implementing the GIS database and portal. HNTB and Iowa DOT Office of Location and Environment staff (the project team) have conducted a series of interviews with stakeholders within the DOT and with other state agencies. The interviews focused on the issues, needs and capabilities desired in a GIS for I-80 as identified by the stakeholders. Following two rounds of interviews, the project team held a visioning workshop focused on establishing a vision for the GIS database and portal that took into account the identified issues, needs and capabilities. This technical memorandum provides summaries and details regarding the following:

- Vision Statement
- Problem Statement
- Stakeholder and User Descriptions
- Product Overview
- Product Features

Once the project team reaches consensus on the concept of operations, the project team will proceed forward with the development of a set of system requirements, a system architecture, and the selection of a hosting option. These early phases create building blocks for later designs phases, and the eventual verification of the resulting system to test back to.

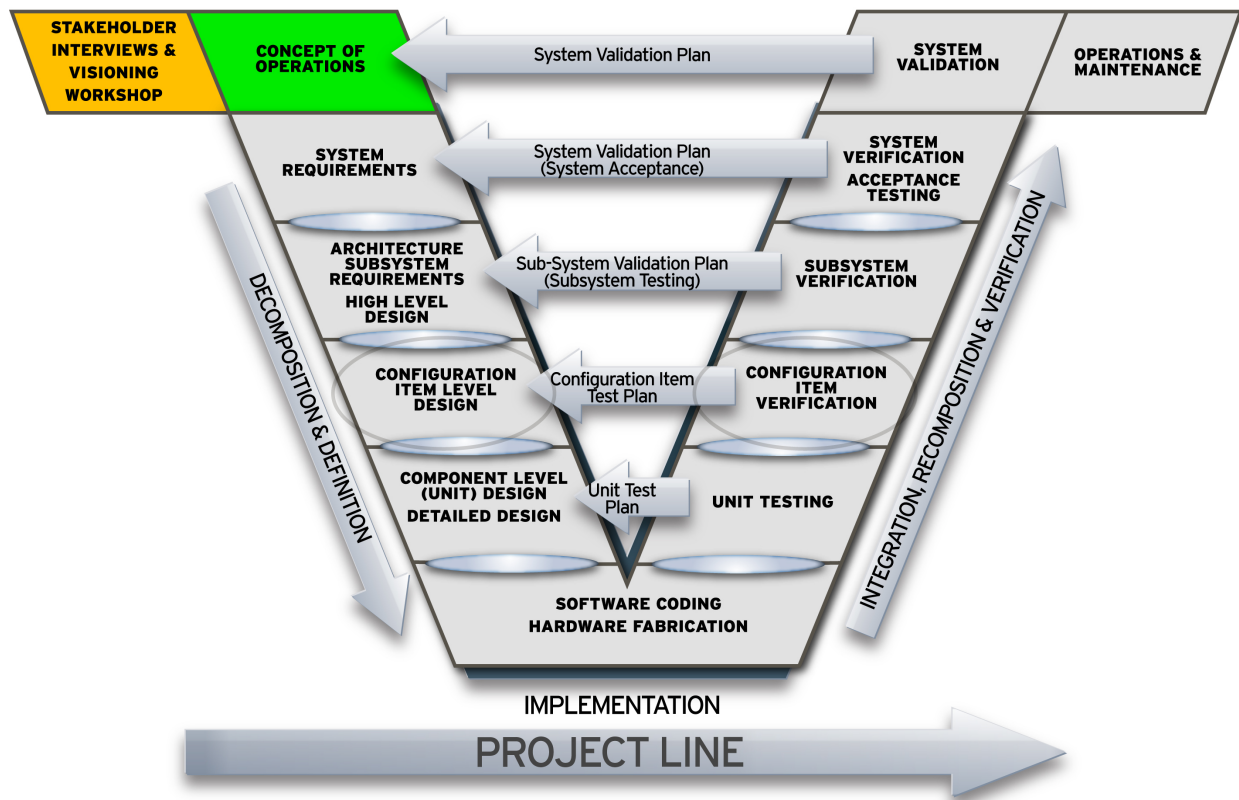
2. Vision Statement

The potential challenges encountered during the systems planning process are not much different than those encountered when conducting an Environmental Impact Statement or Corridor Study. One of the biggest issues to overcome in either process is to not lose track of what the system or preferred alternative is to accomplish when you are “in the weeds” of the systems design or alternatives analysis process. While both processes are ones of discovery, the systems process is unique in that we need to ensure that what we envision the solution to be in the beginning is in fact what it becomes in the end. The systems engineering “V diagram”, illustrated in **Figure 1**, indicates a similar process that the project team will follow for the development of this solution. The area indicated in green shows the current phase that we are in and the area in orange indicates phases that have already occurred.

Conducting in-depth stakeholder interviews and research allows the project team to establish a vision statement of the solution. The project team formed this vision for the solution so that all end-product requirements have a statement to test against.

“A solution that supports environmental data management for the I-80 corridor study.”

Figure 1 – Systems Engineering Process



3. Problem Statement

The complexity of environmental data collection, management and sharing is an identified problem that affects project engineers, analysts and managers. The resulting impact of this fact is frequent rework, lack of proper communication between multiple offices and the inability to ensure proper data transfer.

The I-80 Corridor Database and Portal provides ease of access for project team members of the I-80 Corridor Study, who require a solution for environmental data management. Unlike existing methods of data access and management, this solution supports users with varied skill sets, access through multiple client software and a more efficient data workflow; thus allowing users to stay within their technology comfort zones while ensuring the trust and integrity of project data.

4. Stakeholder and User Descriptions

To provide a resulting solution that meets the real needs of both stakeholders and users, it is necessary to identify and involve all relevant stakeholders as part of the Requirements Analysis process. This section provides a profile of the stakeholders and users involved in the project and also a list of key problems that they perceive to be addressed by the proposed solution. It does not however describe their specific requests or requirements. **A separate document will summarize the information gained from the stakeholder meetings.** Rather, this section provides the background and justification of why we need the requirements for this project.

4.1 Stakeholder Summary

There are a number of stakeholders with an interest in the development of the I-80 Corridor Database and Portal, but not all of them are end users. The following list in **Table 1** describes the identified stakeholder groups and their responsibility with regard to the database and portal solution.

Table 1 – Identified Stakeholders

Name	Description	Responsibilities
Spatial and GIS Team Leaders	Involved with all spatial data coordination within the Iowa DOT.	This stakeholder will coordinate data linkages, provide recommendations for system architecture, and assist with system design implementation.
Project Advisory Team (PAT)	Composed of both client and consultant, as well as the Spatial and GIS Team Leader.	This stakeholder group will develop the statement of need; provide direction for the system solution; and monitor project progress.
External Data Providers	Entities (such as Iowa DNR and counties) that provide data for the corridor study.	This stakeholder will provide existing data and coordinate data linkages to their existing systems.
Engineering / Environmental Consultants	End users of the data who are selected to perform work on NEPA related projects by the Iowa DOT.	This stakeholder will gather data; develop corridors, concepts, or alternatives; perform impact analysis on environmental data; report results of analysis.

4.2 User Summary

The user summary list in **Table 2** describes the end users of the database and portal, outlines the key responsibilities of each user with regard to the solution under development. In the user's absence, it identifies the stakeholder responsible for representing the user's interest.

Table 2 – Database and Portal End Users

Name	Description	Responsibilities	Stakeholder
Data Analysts	Heavy data and system users (input and output)	Data collection, data analysis, data reporting, map production.	PAT & Engineering / Environmental Consultants
Data Viewers	Primarily focused on data output.	Viewing analysis results, performing quality checks, creating reports based on data analysis.	PAT & Engineering / Environmental Consultants

4.3 Summary of Key Stakeholder or User Needs

Table 3 provides a list of the key issues with existing solutions as perceived by stakeholders and users. These needs were solidified in discussions during the visioning workshop, and the priority of a particular need.

Table 3 – Stakeholder and User Needs

Need	Priority	Concerns	Current Solution	Proposed Solutions
Preliminary Corridor Location	High	As projects evolve, the exact location of the preliminary transportation corridor location is difficult to determine, thus making it harder to use data from earlier work.	Ad-hoc capture of location information	Structured capture of Corridor Location
Maintain history of previous study and planning information	High	Many studies in the same area are carried out over a 10-20 year period. It is difficult to locate data and results from these studies	Studies stored based on project number	Multiple methods of accessing planning studies and data based on user needs
Improved data sharing		A data sharing request from external and internal entities requires researching the needs of the entity.	Multiple data and report delivery standards	Standardized data delivery methods
Single source data container		Data often needs to be combined from many different sources	Multiple systems holding data (internal and external)	Single source with “live” links to relevant data sources
Easy, general data searching		Difficult to locate relevant data within a specific project area	Data searches from multiple sources	Easy, general data searches from a single access point
Improve data workflows		Same data may be repeatedly retrieved as projects extend over a long period	Project-based data retrieval	Same data could be retrieved and stored once for future use and updated at pre-determined intervals through structured techniques

Table 3 Continued

Need	Priority	Concerns	Current Solution	Proposed Solutions
View data temporally		Difficult to understand the validity of the data at any particular point in time.	Temporal consistency varies among data types	A consistent set of standards that define what type of data will be a snapshot in time and what types of data will be dynamically updated and maintain temporal information
Geo-spatially referenced ERMS data		Existing documents pertaining to particular locations are difficult to find	Tabular searches	Spatial searches for documents once they are geo-referenced
General Geo-spatial enablement		Some data if geo-spatially enabled would be easier to search, query and display	Significant amount of data, especially project documents that could have a spatial component currently lack it.	A prioritized set of data which will be geo-spatially enabled over time.

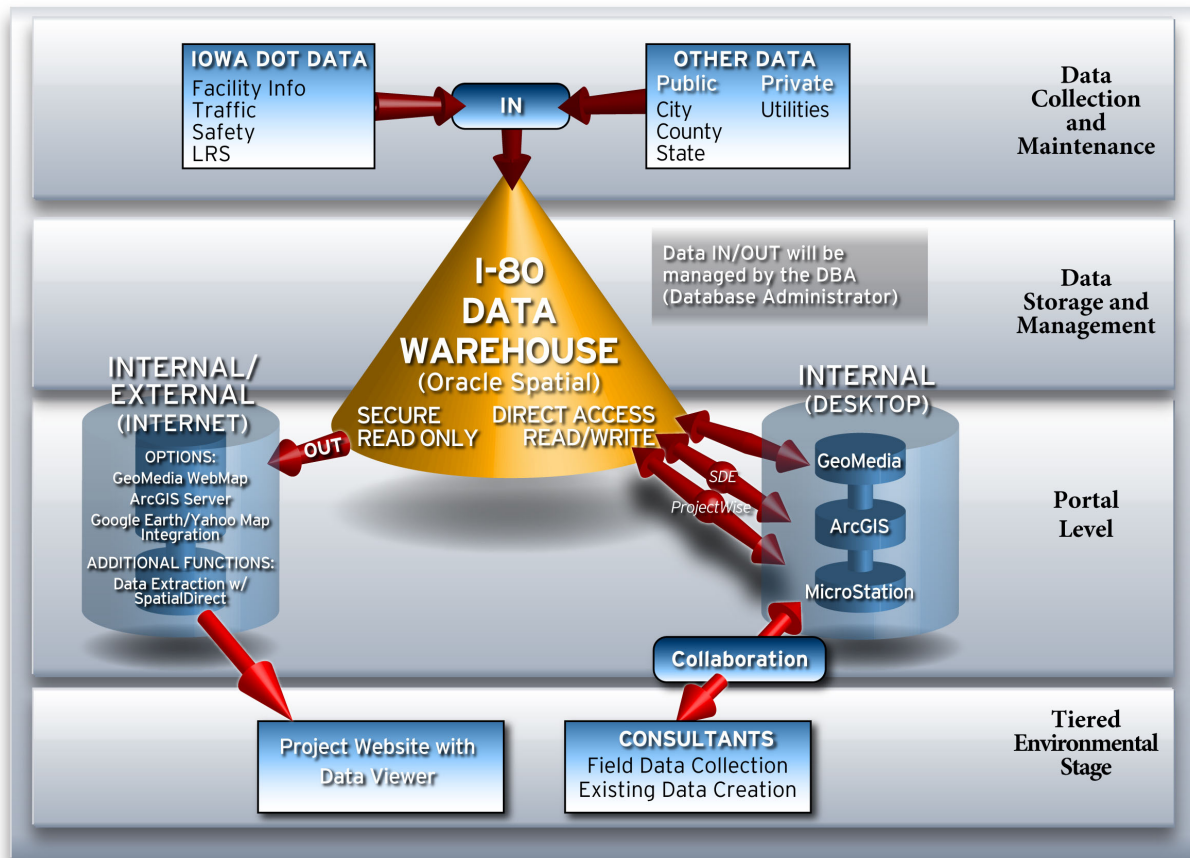
5. Product Overview

This section provides a high-level view of the I-80 Corridor Database and Portal capabilities, interfaces to other applications, and system configurations. The details of product architecture and features will be provided in additional, separate deliverables. This section lists minimum architectural constraints and product features.

5.1 Product Perspective

The resulting solution will become a system that is one of the many spatial data systems within the Iowa DOT. This system will however, link to many of the other in-place systems, as well as other systems that are outside of the Iowa DOT. **Figure 2** displays the system context within which the product will exist.

Figure 2 – System Context



5.2 Assumptions and Dependencies

The resulting solution will be based on a spatial database back-end that resides in an Oracle Spatial environment. The project team will base all portions of database, system, and architecture design on this assumption.

6. Product Features

Product features are a look at the product as it will appear over the long-term. Actual product features implemented for the initial version will allow the development of a long-term roadmap for the product and will be a subset of the features described below, which the project team will detail in subsequent deliverables.

The high level desired features of the database and portal solution are defined as follows:

- Ability to link, reference, or auto-update data/information from outside data systems.
- Ability to link, reference, or auto-update data/information from internal data systems.
- Allow ease of data viewing and data retrieval within current primary, fat client software platforms – GeoMedia, MicroStation, and ArcMap.
- Allow ease of data viewing and data retrieval for novice users.

6.1 Database Features

Since the product is a data management system, the type of data it provides is an essential feature of the system. Thus, it is crucial to describe how data requirements will be gathered and implemented within the system. The process of investigating data needs, prioritizing these needs, designing the data organization and carrying out data transformation and database population must have a strong foundation based on user requirements. Within the Environmental Data Management context, it is envisioned that these processes will be determined through the larger, NEPA workflows. Within the NEPA workflows reside EIS workflows, as currently documented by the Iowa DOT, which contain the most extensive description of data needs. Based on this analysis, it has been determined that data will be captured into the system using the following method:

- The current EIS workflow will be used
- Each process within this workflow will be analyzed for its data needs
- These needs will then be prioritized from a corridor planning perspective
- Appropriate strategies will be developed for data organization and carrying out data transformation and database population
- Additionally, the following database features will be a part of the product:
- Spatial metadata will conform to FGDC (Federal Geographic Data Committee) metadata standards for each layer.

The integration of existing data into the system will need to carry with it some specific processes that include conversion strategies for the following possible conversions: automated MicroStation conversion; current ESRI formats; ERMS file import or linkage; hardcopy data sources; metadata development and maintenance; other file formats.

The establishment of a timeline for data updates and data sharing agreements will be a part of the data management process for the database.

6.2 Portal Features

The data access side of the system will consist of a portal that will contain the following features:

- Standards-based design consisting of Open Geospatial Consortium (OGC) and International Standards Organization (ISO), and adherence to industry standards using commonly adopted GIS practices. To ensure open architecture and interoperability, the portal will be built upon the Intergraph or ESRI GIS software family.
- The project team will divide the Portal into two groups: 1) direct access and 2) view/extraction access (web portal). These groups are not exclusive of one another and could both be used in conjunction with the needs of the Iowa DOT users. As displayed in the system context diagram above, both methods of access will provide secure entry points to the data, but have different functions.
- The integration of SpatialDirect, from Safe Software, will be used which will allow for a seamless conversion of data format, regardless of which software family one chooses to build the Portal.
- To ease access to the data, the portal will provide multiple views into the data based on the type of user that is accessing the system. Examples of these views could include: 1)

a dynamic map based view that incorporates traditional DOT straight-line diagramming techniques, 2) a project folder-based view that uses the current DOT method of organizing project data, and 3) an EIS workflow-based view that allows access to the data based on a particular phase/process within the EIS workflow of a particular project or planning study. The initial versions of the product may only include one or two of these possible views.

- To improve communication, the portal could allow a user to add notations along the corridor that would be visible to other users. This would improve the ability to search and retrieve relevant information. This advanced feature would most likely fall within the long-term roadmap for the product.

7. Conclusion

This document provided a discovery of the vision statement, the identification of key stakeholders and users, and the delineation of conceptual product needs and features of an environmental data management solution for the I-80 corridor study. At the highest conceptual level, this solution is a data warehouse with multiple portal access points. The vision presented in this document provides this solution as the I-80 Corridor Database and Portal.